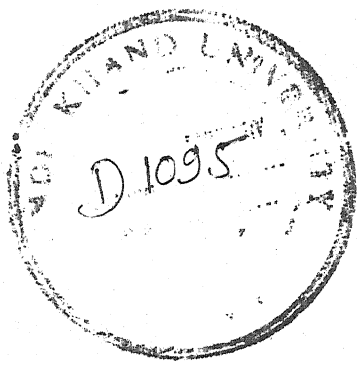
"A CLINICAL STUDY OF CASES OF SMALL AND LARGE BOWEL VOLVULUS WITH PARTICULAR REFERENCE TO THE INCIDENCE OF MOBILE CAECUM IN BUNDELKHAND REGION"

THESIS

FOR

MASTER OF SURGERY

(GENERAL SURGERY)



BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

1990 PANDEY, GIRISH CHANDRA

DEDICATED TO

THE LOVING MEMORY OF MY FATHER

(Late) SRI C.B. PANDEY

WHOSE PASSION FOR HARD WORK

WILL REMAIN A CONSTANT SOURCE OF INSPIRATION

THROUGHOUT MY LIFE

Department of Surgery,
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CERTIFICATE

This is to certify that the work entitled "A CLINICAL STUDY OF CASES OF SMALL AND LARGE BOWEL VOLVULUS WITH PARTICULAR REFERENCE TO THE INCIDENCE OF MOBILE CAECUM IN BUNDELKHAND REGION" , has been carried out by Dr. Girish Chandra Pandey himself in this department.

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C E R T I F I C A T E

This is to certify that the present work entitled "A CLINICAL STUDY OF CASES OF SMALL AND LARGE BOWEL VOLVULUS WITH PARTICULAR REFERENCE TO THE INCIDENCE OF MOBILE CAECUM IN BUNDELKHAND REGION", has been carried out by Dr. Girish Chandra Pandey under my constant supervision and guidance. The results and observations were checked and verified by me from time to time. The techniques embodied in this work were undertaken by the candidate himself.

This work fulfils the basic ordinances governing the submission of thesis laid down by Bundelkhand University.

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His results and observations have been checked and varified by me from time to time.

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GIRISH CHANDRA PANDEY

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I N T R O D U C T I O N :

"Volvulus may be defined as an obstruction caused by a twisting of the bowel upon itself so that it's lumen is closed by the pressure of a part of the intestine continuous with it or it's mesentary (Treves, quoted by Gatch W.D.)". Clinically the term volvulus means a torsion of the bowel on its mesentary.

Since 1836, when Von Rokitansky for the first time described a case of volvulus, voluminous work has been done over the problem, but still a definite treatment for acute volvulus of sigmoid colon and volvulus of caecum and ascending colon is controversial.

In India, volvulus of small bowel is a common cause of intestinal obstruction as compared to sigmoid volvulus (Banerji 1950, Kochar, and Singh 1966). Volvulus of sigmoid colon is less common in India as compared to western countries. Incidence in India is less than 10% (Ojha 1950, Sankaran 1962, Jain & Seth 1966), while incidence in East European countries and Germany is 30-50% (Perlmann & Braune and Wortman quoted by Bacon). Acute volvulus of the caecum is a relatively uncommon condition. It must be appreciated that the term does not describe the condition aptly, as in

addition to the caecum, a variable portion of the ascending colon and of the terminal ileum are found to be involved in the process. The first case of volvulus caecum was reported by Rokitansky in 1841. Its incidence, as recorded in western literature is less than 1% of all acute intestinal obstruction.

Volvulus of sigmoid colon is much commoner in the aged and fragile persons, and this factor is likely to sway the surgeon's choice of operative procedures.

Volvulus sigmoid colon constitutes one of the commonest condition amongst causes of acute intestinal obstruction with which the surgeon is confronted. Thus is more common in Eastern European countries, Scandinavia, and Peru, and accounting for 30-50% of all intestinal obstruction in Russia, Germany & Scandinavia. In India, sigmoid volvulus is common in certain states e.g. North Bihar, South India, Western U.P., Rajasthan and Madhya Pradesh.

Volvulus of small bowel is one of the commonest condition amongst intestinal obstruction. In western countries, it constituted 26% to 48% of all the cases of intestinal obstruction (Cochins 1936, Mc Walters 1945). In India it constitutes 7.9% to 16% in most of the series (Ojha 1950, Anderson 1956, Bhansali and Sathna 1970, Rao 1954 Tanuja 1962).

In the embryologic development of the intestinal tract, the caecum and the right colon moves across the abdomen from left to right to a position in the right lower abdomen where they become fixed. Incomplete peritoneal fixation of the right colon to the posterior abdominal wall results in mobile caecum and ascending colon, which may become twisted and gives rise to development of caecal volvulus leading to acute intestinal obstruction, if not treated early may be fatal to the life of the patient. One of the aim of this study is to find out the prevalence of mobile caecum in Mundelkhand region.

Incidence of small bowel volvulus is significantly high after some abdominal operation (Penn and Kuruvilla 1964, Gill 1966 Mosete and Morton 1950, Anderson 1954). True recurrence after reducing the volvulus by operative method, is low. Mortality rate is high between 25% to 50% (Leonard and Narrow 1938, Skjold 1948). With viable colon, mortality rate is between 5% to 20% while with nonviable bowel it is between 40-60).

Mortality rate of the recorded cases of volvulus of caecum and ascending colon was 33% in Hinshaw and Carter series (1959). This high mortality

rate is due to a sudden onset of gangrene in acute fulminating type of cases.

Being such an important problem, which is a threat to the life of the patient the work done in this field is controversial and it requires constant study and management. With this purpose, this study is being under taken to assess the clinical problems and evaluate the various types of treatment, particularly primary resection of the sigmoid colon and sigmoidopexy for sigmoid volvulus, and tube caecortomy for caecal volvulus. Alongwith this the study is extended to evaluate the incidence of mobile caecum in Bundelkhand region.

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REVIEW OF LITERATURE:

FREQUENCY OF VOLVULUS:

SIGMOID COLON:-

Brunsgaard, in 1947, reported sigmoid volvulus to be more common in the East European countries, accounting for 30% to 50% of all cases of intestinal obstruction. Henry in 1940 reported the incidence of volvulus in America as 7%. In U.S.A. the incidence is approximately 10% of all cases of acute intestinal obstruction. Chalinski (Russia) found 30 cases of volvulus out of 110 cases of acute intestinal obstruction. Krapanas and Stewart (1961) reported 40 cases in whom 116 episodes of volvulus were treated from 1945 to 1959. Wilson and Dunavent (1965) discussed about 62 patients seen at John Gaston Hospital, which accounts for approximately 4% of all the patients with intestinal obstruction and for 16% of all colonic obstruction. Abrams (1963) reported 27 incidences in 23 patients. The most impressive incidence of the volvulus reported by Scott (1965) is that, in Northern Iran, sigmoid volvulus accounts for 85% of all cases of colonic obstruction. Dean and Murray (1952) reported it to be a common cause of intestinal obstruction (25%) in a state

mental hospital, 21 cases were admitted during five years. Wuepper, Ottemann and Stahlgren (1966) reported 39 patients with 63 episodes of sigmoid volvulus. Perimann (quoted by Bacon) reported 215 cases from Russia in which more than 50% were due to volvulus. Brauns and Wortmann (quoted by Bacon) reported 102 cases from Berlin and 23% were due to this condition. Burton (1958) reported 37 patients of volvulus of the colon out of which 29 were of sigmoid colon. In Germany it is 30% of all the cases of intestinal obstruction.

In India volvulus is common in certain states e.g. North Bihar (Banerji 1963), South India (Sankaran 1962), Penn et al (1964), Western Uttar Pradesh (De Walters 1965), Rajasthan (Ojha 1950) and Madya Pradesh (Jain and Seth 1966) Patelay in 1972 studied 33 incidences from January 1964 to December 1966 out of 348 cases of obstruction. Jain and Seth reported 98 cases in 1966, the incidence being 71%. Sankaran in 1962 reported a series of 24 cases of volvulus of sigmoid colon out of 225 cases of intestinal obstruction. Tahaliani (1972) has given a series of 5 cases of sigmoid volvulus in which sigmoidopexy was performed.

SMALL INTESTINE :

Rapstein and Miller (1950) from Canada have reported a series of 23 cases of small bowel volvulus. Mc Walters in 1945 reported a series of 138 cases of volvulus, out of which 36 cases were of small intestine (26%). Cochins (1936) refers to Vick's 176 cases of volvulus collected from 21 British Hospitals for a five year period; there in the volvulus of small intestine forms 46%. In Kerr and Kirkaldy Willis (1946) series there were 7 cases out of a total of 25 cases of acute intestinal obstruction. Moretz and Morton (U.S.A.) 1933 have reported 36 cases of small intestine volvulus out of 261024 cases of intestinal obstruction. On the other hand, Jular and Mc Ianathu (U.S.A. 1963) have shown the incidence of small gut volvulus as high as 6% i.e.. 23 out of 376 cases of intestinal obstruction. O 'Meara (1954) had reported a case of small bowel volvulus who had five times operation of volvulus.

In India the incidence of small bowel volvulus is significantly higher. Banerji (1950) reported 309 cases of volvulus out of 603 cases of acute intestinal obstruction. Out of these, small bowel volvulus was 79.1%. The incidence of volvulus of small intestine as reported by various authors is as follows:-

Ojha (1950) 16%, Andersen (1954) 7.5%, Kochar Rai and Singh (1966) 12%, Khanzali and Sethna (1970), 7.5%, Nab (1954) 20%, Taneja (1962) 7.7%.

CAECUM AND ASCENDING COLON:-

The first case of volvulus of caecum was reported by Rokitansky in 1841. Following that, no thorough consideration of the condition appeared until the work of Monteuffel, who reported 26 cases in 1899. Faltin in 1902, reported 79 cases including those above mentioned. By 1913 Sundschuh was able to collect some 110 cases and in 1942, Wolfer, Seaton and Anson collected an additional 193 cases making a total of 304. Of these 193 cases 40 occured in North America. Its' incidence as recorded in literature is less than 1% of all acute intestinal obstruction. But there is a definite rise in the incidence during pregnancy. The earliest recorded case of volvulus of caecum associated with pregnancy was described by Brown in 1883. Rai and Kochar (1970) reported 4 cases of volvulus of caecum out of 239 cases of intestinal obstruction (1.3%). Hinshaw and Carter (1950) reported 14 cases of volvulus of caecum in a period of 16 years. Lambert's excellent and very complete report in 1931 consisted of sixty one cases of volvulus complicating pregnancy i.e. 29 of

sigmoid colon, 16 of caecum and 16 of small intestine. Kohn and Bride (1964) presented 18 cases of volvulus complicating pregnancy e.g. 12 of sigmoid colon, 3 cases of caecum and 3 of small intestine.

AGE AND SEX INCIDENCE:

SIGMOID VOLVULUS:-

It has been reported by many authors that the disease is 3-4 times more common in men and has its' maximum incidence in middle and advanced years (Ingalls, Lynch and Schilling 1964, Abrams 1963, Wilson and Dunavant 1965, Partimer and Ralph Severe 1962, Pool and Dunavant 1951, Gaurkink, and Bass 1967).

Drapanas and Stewart (1961) reported twice as many male patients (27 male and 13 females) and that 88% were of 55 years or older, varying from 1/2 years to 94 years of age. Scott (1955) reported that 63% of his patients were less than 50 years of age. Butsford et al (1967) reported that 13 out of 18 patients were above the age of 60 years. The youngest was 18 years and oldest was 92 years. Baxton (1958) reported 29 cases of volvulus of sigmoid colon with a ratio of male and female, 60:40. Dean and Murray (1952) reported 21 cases of volvulus of sigmoid, in which the ratio between males and females was 2:1 .

In India, according to Jain and Seth (1968) volvulus of the sigmoid colon is rarely seen in an individual under 30 years of age and it is commoner in men than in women. Pataley (1972) reported 33 cases, out of which 26 were males and 7 were females. The age ranged between 32 to 65 years. Tambaku (1970) reported 22 cases of sigmoid volvulus of which 21 were males and 1 was female, the average age was 35-45 years.

SMALL INTESTINE:

Penn and Kuruvilla (1964) reported 31 cases of small bowel volvulus of which 29 were males and 2 were females and the peak incidence was in the age group 20-40 years (20 cases out of 31 cases). Anderson (1957) reported that average age for small bowel volvulus was 30 years and sex ratio between males and females was 12:2 . Banerjee (1950) reported 309 cases of small bowel volvulus of which 295 were males and 14 were females and the maximum incidence was seen between 21-30 years of age. Ojha (1950) reported 18 cases of small bowel volvulus, of which 11 cases were between 20-40 years but all were females. Morets and Morton (1950) reported 36 cases of small bowel volvulus ranging between age groups of 2 days to 60 years but the maximum incidence was encountered between 20-40 years (50%). In the series of Babcock (1946) 66% patients were males and the

disease was more common in adults under 40 years of age or in children.

CARCINOMA

In Wilson's series (1965) 11 out of 29 patients were females. While in the series of Kochar and Rai (1970) all the 4 patients were males. In Hinshaw and Carter's (1959) series the ratio between male and female was equal (seven males and seven females) and the average age was 55 years ranging from 15 to 84 years. Saint (1958) has reported that this disease is found between the ages of 20-40 years and is equally common in both the sexes.

In the series reported by Veltin (1951) 45% were between the ages of 17 and 30 years. The youngest patient reported was an infant 10 months old and the oldest patient was a man of 69 years. In McGraw, Kraemer and Rigler (1948) series all the 4 patients were above 50 years of age and all were males. According to the above authors volvulus of caecum is more common in males than in females in the ratio of 2:1 . Dixon and Meyer (1948) reported 12 cases of which 3 were of recurrent type. In Jorden and Beahrs (1953) series, of the 6 cases of caecum and ascending colon volvulus 5 were women, whereas the condition is said to occur more in male. 70% of the patients who had caecal volvulus

were less than 40 years of age whereas four of these six patients were more than 50 years of age.

DIETARY HABITS:

The diet of coarse indigestible food (Jwar or Bajara bread, Ugai, Makka, Millet, green vegetables, potatoes) produces excessive loading of the bowel and in those taking large meals at irregular intervals or after short or long periods of fasting, the importance of this factor is magnified elongation of mesentary due to traction of the mesentary by the heavily loaded bowel containing coarse indigestible meals imperfectly baked or cooked. Kerr and Kirkaldy (1946) have emphasized over the diet in African people. They take two pints of maize gruel meal in the morning and this meal is again repeated in the day but no solid meal is taken till evening. Sudden dilatation of small intestine by thick liquid causes overloading of one or more loops which during exertion may become displaced and start the formation of volvulus. The resultant spasmodic peristalsis may complete the process.

ETIOLOGICAL FACTORS:

SIGMOID VOLVULUS:

V. Sankaran (1962) divided the causes into:-

1. Dietetic.

2. Congenital or acquired long pelvic mesocolon.

3. Congenital or inflammatory narrow base of pelvic mesocolon.

1. DIETETIC:

Significance of large amount of vegetable diet have been reported by various workers as the contributing factor for the high frequency, of volvulus of sigmoid flexure.

The residue of such a heavy meal will tend to accumulate in the pelvic colon and weigh down a congenitally long colon and may well, over a period of years, elongate it further and so pull on the mesentery tending to shorten the base of mesocolon attachment. The weight of the solid excreta in the pelvic colon acts as reservoir which might exert this pull.

2. CONGENITAL OR ACQUIRED LONG PELVIC MESOCOLON:

The congenital longer sigmoid flexure are more common in men than in women. This may account for the larger number of cases observed in men. The greater incidence in certain areas of Europe is usually attributed to elongation of the sigmoid mesocolon secondarily to a diet high in vegetables and other foods which have a large residue and produce bulky stools. Constipation may also be a contributing factor

to this mechanism as the redundancy may be progressive. A second feature leading to volvulus is that an efferent and an efferent loop lie in close approximation to each other and its' mesocolon is both long as well as freely mobile with its' narrow base at the site of attachment. Chronic constipation is one of the factors responsible for elongating the pelvic colon. The distal colon gets distended with faeces, and develops a thickening of its' wall. Constipation and fermentation of gas and the consequent distension lifts the sigmoid loop up into abdominal cavity and as the proximal sigmoid loop dilates, it becomes more tense because of its' fixed attachment with the descending colon, meanwhile the lower portion of the sigmoid and upper part of rectum, which are less fixed, rise and as the least resistance is to the left, the distended lower portion of the sigmoid and rectum move in that direction. The upper portion of the sigmoid moves down to the right and the volvulus is produced.

3. <u>NARROW ATTACHMENT OF PELVIC MESOCOLON:-</u>

Is regarded as congenital or following inflammation at the base of the mesentary.

High incidence of sigmoid volvulus in Neuropsychiatric patients from mental hospital has been reported by various authors viz: Dean and Murray (1952), 74%, Buxton (1964) 43%, Drapanas and Stewart in (1961) 80%, Gabriel and Campbell and Hunnelmann, Schultz, Myhers and Harkins (1953) 50% to 70%.

SMALL INTESTINE:-

Some authors (vide infra) have divided the small bowel volvulus into two groups, primary and secondary. By secondary they mean volvulus occuring after any abdominal operation (Mckechnie Priestly 1936, Moretz and Morton 1950, Anderson 1954, Penn and Kuruvilla 1964).

The exact cause of primary volvulus is unknown but certain predisposing factors have been given by Ojha (1950).

1. VOLVULUS OF ISOLATED LOOP OR LOOPS OF SMALL INTESTINE DUE TO:
   (a) Bands- Post operative or post inflammatory or congenital.
   (b) Adhesions- Tubercular, non-specific or post operative.
   (c) Tumours, mesenteric cysts or other cysts (Dermoid).

(d) Foreign body and worms.

(e) Strictures.

(f) Pregnancy.

(g) Constipation.

(h) Meckel's diverticulum and other diverticulum.

2. VOLVULUS OF ALMOST THE WHOLE OF SMALL INTESTINE:

Due to dietitic habits of eating coarse millets and corn or similar heavy vegetable diet with or without period of fasting, associated with:

(a) Abnormality of base of mesentery due to tuberculous glands or non-tubercular glands.

(b) Shortening of the base of mesentery.

(c) Lengthening of the mesentary.

(d) Sclerosis of mesentery and its fibrous shrinkage.

(e) Any of the remaining conditions under(2) .

(f) Visceroptosis.

3. Volvulus of small intestine alongwith that of caecum and ascending colon.

DIET:

Elongation of mesentery occurs due to traction of the mesentery by the heavily loaded bowel containing coarse indigestible imperfectly baked or cooked and due

to spasmodic peristalsis of the bowel to get rid of the excessive roughage (Ojha 1990). As a compensatory phenomenon to elongation of mesentery, shortening of the root of mesentery can take place. Fixation, thickening and shortening of base of this mesentery by enlarged chronically inflamed glands at the root due to tubercular or non-tubercular infections, aggravates the condition by providing a point of suspension for the serpentine pendulum of small intestine, suspended now with an abnormally long fan shaped rope, with an already narrower end, further narrowed down and fixed inelastic (due to sclerosis, contractions and adhesions) base, so that, it would be rather surprising if the volvulus should not take place in the presence of all these predisposing factors. The normal mesentery is pliable and elastic and thus allows easy and safe play of the intestinal movements.

Rapstein and Miller(1950), Shannali and Sethna (1970), have also contributed the same factors for the causation of volvulus of small intestine.

VOLVULUS OF CAECUM AND ASCENDING COLON:

Normally the attachment of the caecum to the posterior abdominal wall prevents the occurrence of volvulus. Faltin (quoted by Wangensteen 1942), has reported that volvulus of caecum is only possible in the

absence of fixation of caecum, or in the presence of a mesocaecum or mesocolon sufficiently mobile to permit the torsion; in such cases the caecum usually exhibits a continuation of mesentery possessed by the terminal ileum. Many cases present, in addition, failure of complete rotation of the right colon. Rixford Harvey (quoted from Wangensteen 1942) noted un-natural free motion of the caecum and ascending colon in 13.3% of the examination performed upon 100 infants at autopsy. Chalfant (quoted from Wangensteen 1942) stated that unusual mobility of the caecum and ascending colon were present in about 20% of persons of all ages.

Saint (1958) has reported that characteristically such a caecum is large, flabby, thin walled and atonic and because of the elongated mesentery, often lies prolapsed in lesser pelvic. The axis of the twist is usually around the ileocolic artery. Other predisposing factors have been reported by Mochar and Rai (1970) such as pregnancy, over eating, previous operations, diarrhoea, violent coughing. The same precipitating factors have been enumerated by Hinshaw and Carter (1959).

PATHOLOGY:

Hinshaw and Richard Carter (1957) reported that torsion of 180° to 360° is usual but in caecal torsion

and volvulus of small intestine twists of 520° to 720° may be seen. With broad mesenteric attachment, a twist of more than 180° is unusual. It is the tightness of the twist rather than the number of twist which determines the pathological changes of tissue necrosis. In incomplete obstruction or those in which the torsion develops gradually, both gas and fluid may be found in different quantities within the strangulated segment. When complete occlusion of the bowel is established by torsion, the fluid within the loop will usually exceed the amount of gas present. The direction of twist in torsion of small intestine is usually clockwise though counter clockwise twists are observed. Torsion of caecum is usually anticlockwise. Clockwise twist is more common in sigmoid but both varieties occur also in sigmoid volvulus.

Free peritoneal fluid, haemorrhage, into bowel and infarction of its wall, gangrene and perforation of the twisted segment with associated peritonitis are natural sequlae of the occurrence. Submucous vascular plexus is particularly vulnerable to the flattening force exerted by pressure within the lumen. It has been shown by Gatch and Culbertson (1935) that the bowel is made practically bloodless when intraluminal pressure equals or exceeds the diastolic blood pressure. At this level it stops all absorption by way of mesentery.

Ordinarily, veins are occluded first by the strangulating force, the bowel then becomes bluish black in colour and, occasionally, it can be outlined as a tympanitic, semirigid mass, (Wahl's Sign). This venous occlusion produces haemorrhagic infarction of the segment with loss of blood sufficient to produce shock, particularly in the case where a long loop is involved in volvulus. Toxins, bacteria and blood pass through the bowel wall permeating the peritoneal fluid. This forms the basis for peritoneal irritation as seen clinically.

In the clinical management of the patient, suffering from advanced obstruction, it seems desirable to deflate the bowel gradually before the operative relief of the obstruction is undertaken, otherwise barriers against absorptions of toxins by way of the peritoneum and against their rapid absorption by way of mesentery, may be broken down.

CLINICAL FEATURES:

SIGMOID VOLVULUS:

Hinshaw and Carter (1957) reported 55 cases and classified the clinical features into two main groups:-

1. Acute fulminating type:- Characterised by unusual occurence in younger age group, sudden onset and rapid course, diffuse abdominal pain and tenderness, early development of gangrene and frequently stimulating a perforated viscus or some other abdominal catastrophe.

2. Subacute progressive type:- which is more common, usually occurs in older patients, has a more gradual onset, runs a more benign course and develops non-viability of bowel more slowly.

Various authors have reported various clinical features, but the majority of the patients complain of abdominal pain, exhibit marked abdominal tympanitis and give a history of chronic constipation; vomiting is not a prominent feature.(Drapanas & Stewart 1961, Wilson and Dunavant 1965, Brumgaard 1967, Botsford Mealey & Veith 1967). Ingalls, Lynch and Schilling (1964) have described some clinical features as those described by Hinshaw and Carter and also by Abrams (1963). The common findings were abdominal distension (79%), pain (50%) and nausea and vomiting (25%).

Deen and Murray (1952) described that chronic sigmoid volvulus was characterised by recurrent exacerbation of painless abdominal distension, massive visible peristalsis and obstipation.

SMALL INTESTINE:

Moretz and Morton (1950) have reported that majority of the patients had severe crampike upper abdominal or paraumbilical pain. Nausea and vomiting are usually prominent features in the clinical history. Only two patients out of 36 had neither of these symptoms. Vomitus was 'faecal' or very foul smelling in most of the cases. Constipation was present in 14 cases. The most common finding on examination was tenderness and abdominal distension. There was localisation of tenderness which varied according to the loop of bowel involved. In more advanced cases generalised tenderness was present. Distension was present in 25 cases and absent in 6 cases. Peristalsis was present in more than 50% of cases. Fluid within the abdominal cavity was noted in 7 of these patients (20%). An abdominal mass was palpated in 6 patients.

In the Mahashnie and Priestley series (1936), 7 cases, including two of these with acute volvulus, had no significant abdominal findings on local examination. Physical examination commonly reveals' distension, tenderness and rigidity'. Pain was present in 85.7%, nausea and vomiting in 74%, constipation in 51.4% and distension in only 11.4% . The pain was colic like in 45.7% and steady in 37.2% .

In the series reported by Leonard and Darrow (1938) abdominal pain and vomiting were present in 100% . Constipation was present only in 39% and distension was present in 37% . Abdominal tenderness and rigidity were found rarely in their series.

Gill and Eggleston (1964) reported in their series that patients with volvulus of small bowel were admitted as acute surgical emergencies with vomiting, constipation, abdominal colic and progressive, abdominal distension of central type. According to Banerjee (1950), vomiting is not a marked feature though there are always a few vomits at the onset. Distension is of central type. Visible peristalsis as ladder patterns and peristaltic roars are present in all cases except in late ones.

Minshew and Carter (1959) suggested a clinical classification into two major types. First, the acute fulminating type is characterised by a sudden onset of symptoms, rapid clinical course, severe abdominal pain and signs of peritoneal irritation. The second clinical variety of volvulus of caecum is the acute obstructive type. It's chief feature is low, small intestinal obstruction, with intermittent cramping abdominal pain associated with peristaltic rushes, obstipation and vomiting. There are usually no significant findings to

suggest peritoneal irritation and scout film of abdomen show a distended small bowel.

All the patients of caecal volvulus in Kochar and Rai series (1970) belonged to the acute obstructed type and there was no case of acute fulminating type or of chronic recurrent type.

DIAGNOSIS:

SIGMOID COLON:

The diagnosis of the volvulus is suggested by the history and physical findings and confirmed by X-ray and sigmoidoscopic examination. A flat film of abdomen shows markedly dilated sigmoid, assumes the shape of a 'bent inner tube' or a 'large horse shoe'. Barium enema may reveal twisting at the site of obstruction giving rise to what is called as 'birds beak' appearance (Ingalls, Lynch and Schilling 1964).

In a supine scout film of the abdomen, a greatly distended loop of colon arising from pelvis and going to left or right upper abdomen is seen (Drapanas & Steewart 1961 and Tambaku 1970). Wilson and Dunavant (1965) advocate that the twist in the sigmoid can be visualised in majority of cases by sigmoidoscopy. Pateley (1972) reported that in 65% of cases, the diagnosis was made by clinical examination.

Plain X-ray of abdomen is of immense help in confirmation of the diagnosis.

SMALL INTESTINE:

According to Moretz and Morton (1950), no pre-operative diagnosis was made in 8 cases out of 36 cases of small bowel volvulus. Of the remaining 28 cases, the diagnosis of small bowel obstruction was made in 17 instances (47.2%). The diagnosis of volvulus was made correctly in 7 cases. In patients seen relatively late, the diagnosis of intestinal obstruction was usually obvious, whereas the cause of obstruction was obscure. Among the wrong diagnosis were mesenteric thrombosis, large bowel obstruction, acute appendicitis, perforated duodenal ulcer, twisted ovarian cyst. In those cases seen shortly after the onset of initial pain, the problem was more that of a differential diagnosis of the acute abdomen, and clinical intestinal obstruction had not yet developed. However, the diagnosis could be made by the history, physical findings and plain skiagram of the abdomen. Keohar, Rai and Singh (1966) have mentioned that it is not possible to make a specific diagnosis of the cause and type of obstruction, but radiating stripe of mucosal folds, though such a picture is uncommon, is highly suggestive of volvulus of the small bowel. Similarly, Fenn and Kuruvilla (1964) have reported that X-ray examination is always successful in confirming the diagnosis of small intestinal obstruction but, made a

diagnosis of volvulus in only half of the cases.

CAECUM AND ASCENDING COLON:

Weiner (1956) reported 6 criteria where early diagnosis of caecal volvulus could be made by X-ray examination of the abdomen. The radiological findings were:-

1. Great distension of caecum which is ectopically placed, located frequently in left upper quadrant.
2. Distended loops of small bowel located to the right of the caecum .
3. Visualization of ileo-caecal valve to the right of the caecum when the caecum is outlined by gas.
4. Mucosal folds at the point of obstruction may be outlined by gas and assume a spiral contour.
5. Evidence of obstruction of small intestine.
6. Presence of a single horizontal fluid level in the caecum.

According to Minshew and Carter (1959) an understanding of the basic features of the two chief types is important in the early diagnosis of volvulus of caecum. The acute fulminating type must be considered in the diagnosis of any acute catastrophic abdominal

condition. But roentgenographic studies may be diagnostic. Roentgenographic studies are essential in the diagnosis of volvulus of caecum. In the acute fulminating type, the roentgenographic findings are largely confined to the distended loop of caecum and ascending colon with minimal small bowel distension. However, in acute obstructive variety, a well developed pattern of distended small bowel is usually seen in addition to the dilated caecum or right colon.

In 1937, Easton and Adams made a pre-operative diagnosis of volvulus of the caecum by means of a barium enema. They postulated that two conditions indicated the presence of a volvulus of the caecum. First was an obstruction to the passage of barium by enema at certain points in the ascending or transverse colon. The second was the simultaneous presence of al large collection of gas at the site of the caecum, either in the midline or slightly to the right of it.

MATERIAL AND METHODS:

The present study includes cases of small and large bowel volvulus and mobile caecum admitted in M.L.B. Medical College, Hospital, Jhansi during June 1988 to August 1989. Total number of cases included in this study are 100 . The cases of acute intestinal obstruction due to volvulus which were confirmed by taking detailed history, clinical examination, investigations, X-rays and exploratory Laparotomy. And cases of mobile caecum confirmed during exploratomy Laparotomy was the criterion for selection of cases for this study. All the cases included in this study were diagnosed clinically and radiologically. The final confirmation and assessment of aetiological factors was done by laparotomy.

All the cases were studied in the following manner:-

I - DETAILED HISTORY:

(i) Particulars of the patient: It included name, age, sex, caste and address.

(ii) Dietary habits: Vegetarian, Nonvegetarian, taking roughage diet, or type of diet taken.

(iii) Family History: Any such sort of compliant in the family members and history of TB.

(iv) Past History: Similar sort of illness in the past and history of previous operation, if done.

(v) Personal History: Enquiry was made in to the personal habits of the patients regarding bowel habits, appetite, and quantity and quality of diet.

(vi) Social History: History regarding the social and economic status, about living conditions, occupation and income was elicited in order to find out the disease incidence in relation to the social status of the patient.

(vii) Compliants with duration: They were recorded in following manner-

(a) Pain:- Duration, Severity, nature, site, radiation, Character (mild, moderate, severe, burning, gripping, dullache), Aggravating and relieving factors.

(b) Distention of abdomen:- Enquired

about if the distention was preceded by vomiting or vice versa.

(c) Vomiting:- The patients were enquired about the frequency, character of vomitus, colour of the vomitus, any foul odour, whether it was mixed with blood either.

(d) Constipation:- The patients were asked about their bowel habits, whether the patient has only constipation or did not pass even flatus and for howlong.

(e) Fever:- Regular, Irregular, high, low, and if associated with chills and rigors.

II - PHYSICAL EXAMINATION:

(1). General Examination:- General built, pulse temperature, Blood pressure, anaemia, Jaundice respiration and lymphadenopathy.

(2). Systemic Examination:- Examination of cardiovascular system, respiratory and Nervous system.

(3). Examination of Abdomen:- Examination of the abdomen was recorded in the following manner:

(a) Inspection:- Contour of the abdomen, position of the umbilicus, distention either central or peripheral, any venous prominances, any scar of previous operation, movements with respiration, visible peristalsis, visible lump, and hernial sites.

(b) Palpation:- Feel of the abdomen either soft, firm or tender, rigidity, Rebound tenderness, Liver dullness.

(c) Percussion:- Resonant or dull, shifting dullness.

(d) Auscultation:- Bowel sounds, or Borborygmi.

(e) Rectal examination/Vaginal examination.

III - INVESTIGATIONS:

Following investigations were recorded in all the cases:-

1. Blood:- Total and differential leucocyte counts, Hb%, and erythocyte sedimentation rate.

2. Blood Urea.

3. Blood Sugar.

4. Urine:- Urine Sugar.
Urine Albumin.
Microscopic examination.

5. Plain X-ray abdomen:- (1) AP view.
(2) AP view in erect posture for gas under diaphragm.

Exploratory Laparotomy:- The findings of the exploratory Laparotomy were recorded in the following lines:

(1). Type of volvulus:- This was either of the following types:-

a). Small Bowel volvulus:- In small bowel volvulus also it was noted that either the volvulus was of the upper small bowel or lower small bowel.

b). Large Bowel Volvulus:- They were either of the three types:-

i) Caecal (ileocaecal) volvulus.
ii) Transverse colon volvulus.
iii) Sigmoid volvulus.

(2). Predisposing factors:-

A. Small Bowel volvulus:

a) Congenital bands:- Specially looked for either they were single or multiple or if

they were present in any other part of abdomen.

b) Abhesions:- Either multiple or at diffirent sites.

c) Tubercular lymph nodes:- Specially searched for caseating mesenteric lymph nodes, if, enlarged, biopsy was taken.

d) Malrotation:- Either clock wise or anticlock wise.

B. Caecal volvulus:-

1) Mobile caecum with mesentary:- The mesentery of the caecum is measured by sterile threads and extent of mesentary was noted.

2) Band and adhesions:- Similarly as for other volvulus cases.

3) Malrotation:- Either clock wise or anticlock wise.

C. Sigmoid volvulus:-

1) Narrow attachment of mesentary:- The mesentary was measured by the similar method applied for other volvulus cases.

ii) Long loop:- Length of the loop was measured.

iii) Loaded colon:- The loop of sigmoid colon and pelvic colon was looked for either it is loaded with faecal matter.

3. Idiopathic:- These cases were labelled, where no predisposing factor was found in exploratory Laparotomy.

4. Associated Pathology:- The associated pathologies along with volvulus were recorded in master chart. They were as follows:-

1. Gangrene of the bowel.
2. Peritonitis.
3. Perforation.

In cases of mobile caecum the history was taken in detail as for cases of intestinal volvulus. After full clinical, radiological and Haematological examination a planned Exploratory Laparotomy was performed. The predisposing factors, other associated pathologies and complications were recorded in the master chart.

When full assessment was made a definite surgery was performed and recorded in master chart.

O B S E R V A T I O N S :

This istudy includes 100 cases of small and large bowel volvulus admitted in M.L.B. Medical College, Hospital, Jhansi during June 1988 to August 1989. These cases of volvulus were observed in 270 cases of acute intestinal obstruction admitted during the corresponding period. Only those cases whose diagnosis was confirmed at Laparotomy were included in this study. So in our study volvulus constituted 37.37% of total cases of acute intestinal obstruction.

TABLE NO. I

I- Incidence of various types of volvulus in whole year from June 1988 to August 1989.

S.No.	Type of Volvulus	Total No. of cases
1.	Sigmoid Volvulus.	30
2.	Small Bowel Volvulus.	56
3.	Caecal Volvulus.	14
	Total	100

Table No. 1 shows that small bowel volvulus was the most common cause of acute intestinal obstruction. Second in occurrence was sigmoid volvulus and remaining

14 cases were of ileocaecal volvulus.

TABLE NO. II

II- Percentage of various types of volvulus according to anatomical sites.

S.No.	Type of Volvulus	Total No. of cases	Percentage
1.	Sigmoid volvulus.	30	30%
2.	Small bowel volvulus.	56	56%
3.	Ileocaecal volvulus.	14	14%
	Total	100	100%

The above table reveals that out of 100 cases of volvulus 56% cases were of small bowel volvulus, 30% cases were of sigmoid volvulus and remaining 14% cases constituted ileocaecal volvulus.

TABLE NO. III

III- Showing Sex incidence in various types of volvulus.

S.No.	Type of volvulus	No. of males	Percentage	No. of females	Percentage
1.	Sigmoid volvulus.	18	60%	12	40%
2.	Small bowel volvulus.	36	64.28%	20	35.72%
3.	Caecal volvulus.	8	57.14%	6	42.87%
	Total	62	62%	38	38%

Table No. XIX shows that the incidence of all types of volvulus was higher in males as compared to females. The incidence of small bowel volvulus was 64.28% in males and 35.72% in females, incidence of sigmoid volvulus was 60% in males and 40% in females, while for ileocaecal volvulus the incidence for males and females was 57.14% and 42.86% respectively.

TABLE NO. IV

IV- Incidence of various types of volvulus in relation to different age groups.

Type of Volvulus	Total No. of cases	Age in years						
		0-10 years.	11-20 yrs.	21-30 yrs.	31-40 yrs.	41-50 yrs.	51-60 yrs.	61-70 yrs.
1. Sigmoid volvulus.	30	0	1	5	3	7	10	4
2. Small bowel volvulus.	56	3	7	14	16	7	6	3
3. Caecal volvulus.	14	1	1	3	5	3	1	0
Total	100	4	9	22	24	17	17	7

Table No. IV shows that maximum incidence of sigmoid volvulus was seen in age group of 51-60 years i.e. 10 patients out of 30 fall in this group (33%). The oldest patient was 70 years Hindu male and the youngest was 14 years Hindu male.

The maximum incidence of small bowel volvulus was observed between the age group of 21-40 years i.e. 30 patients out of 56 were in this group (53.58%). The youngest patient in this series was a 2 years Mohammedan male child, while the oldest patient was a 68 years Hindu male.

The volvulus of caecum was seen maximum in the age group of 21-50 years. 11 out of 14 patients were in this group (78.57%).

TABLE NO. V

V- <u>Showing the distribution of cases according to their residence.</u>

Type of volvulus	Total No. of cases	Rural Population	Percentage	Urban Population	Percentage
1. Sigmoid volvulus.	30	22	73.33%	08	26.67%
2. Small bowel volvulus.	56	38	67.85%	18	32.15%
3. Caecal volvulus.	14	08	57.15%	06	42.85%
Total	100	68	66.11%	32	33.89%

Table No. V shows that all types of volvulus are common in rural population. Sigmoid volvulus is

rural population is 73.33%, small bowel volvulus in rural population is 67.85% and ileocaecal volvulus is 57.15% in rural population.

TABLE NO. VI

VI- Showing incidence of volvulus according to religion.

Type of volvulus	Hindu's	Percentage	Muslims	Percentage
1. Sigmoid volvulus.	25	83.33%	5	16.67%
2. Small bowel volvulus.	36	64.28%	20	35.72%
3. Caecal volvulus.	10	71.42%	4	28.58%

Table No. VI shows that percentage wise distribution of all types of volvulus is higher in Hindu's as compared to muslims. Small bowel volvulus 64.28% , sigmoid volvulus 83.33% , and ileocaecal volvulus 71.42% were among Hindus.

TABLE NO. VII

VII- Showing dietary factors.

Total No. of cases.	Vegetarian	Percentage	Non-vegetarian	Percentage
1. Sigmoid volvulus.	18	60.00%	12	40.00%
2. Small bowel volvulus.	36	64.28%	20	35.72%
3. Ileocaecal volvulus.	10	71.43%	4	28.57%
Total	64	64%	36	36%

Table No. VIX revealed that all the types of volvulus were common among vegetarians. 64 patients out of 100 cases of volvulus of various types were vegetarians (64%).

TABLE NO. VIXI

VIXI- Showing incidence of symptomatology.

Symptoms	Sigmoid volvulus	Percentage	Small bowel volvulus	Percentage	Caecal Volvulus	Percentage
1. Pain in Abdomen.	30	100%	50	89.28%	14	100%
2. Constipation.	30	100%	40	71.42%	10	71.42%
3. Distention.	30	100%	35	62.50%	10	71.42%
4. Vomiting.	10	33.33%	50	89.28%	14	100%

Table No. VIXI shows that in cases of sigmoid volvulus the most prominent symptoms were pain in abdomen, constipation and abdominal distention (100%), and vomiting was least to occur. Only 10 out of 30 cases had vomiting (33.33%).

In cases of small bowel volvulus the most prominent symptoms were pain in abdomen and vomiting. These features were present in 50 out of 56 cases of volvulus i.e. 89.28% . constipation encountered in 40 cases (71.42%). While

distention was the presenting feature in 35 cases of small bowel volvulus(62.36%).

In cases of caecal volvulus the prominent features for which the patients were admitted pain in abdomen and vomiting. 14 out of 14 cases of caecal volvulus had these symptoms (100%). Constipation and distention were second in occurrence (71.42%).

TABLE NO. IX

IX- Showing duration of symptoms on admission.

Duration in days	sigmoid volvulus	Small bowel volvulus	Caecal volvulus
With in 1st day	2	9	1
With in 2nd days	10	13	3
With in 3rd days	10	20	4
With in 4th days	3	6	2
With in 5th days	1	5	1
With in 6th days	2	1	2
With in 7 days	1	2	1
With in 8 days	1	0	0
Total	30	56	14

Table No. IX shows that 20 cases of sigmoid volvulus came on second and third day of the onset of their symptoms. The shortest duration was 16 hours in a

man aged about 25 years male (Hindu), while the longest duration was 8 days in one patient of 70 years female.

42 cases of small intestinal volvulus came within first 3 days of the onset of their symptoms. 11 patients came on the fourth and fifth day of the onset of their symptoms. 2 patients came on the seventh day and both of them expired after operation due to severe peritonitis.

10 out of 14 cases of caecal volvulus admitted within first four days of starting of their symptoms. The longest duration for the patient who was brought to the hospital was 7 days.

TABLE NO. X

X- Showing physical signs.

Physical signs	Sigmoid volvulus	Small bowel volvulus	Caecal volvulus
1. Distention.	30	96	11
2. Bowel sounds.	25	50	8
3. Visible Peristalsis.	10	25	7
4. Tenderness.	8	48	12
5. Hyper-resonance.	30	51	4
6. On Per rectal exam. Empty rectum.	30	50	7

Table No. X concludes that all the cases of sigmoid volvulus were having distention of abdomen, hyperresonance and empty rectum on per rectal examination. Bowel sounds were present in 25 cases out of 30 . Visible peristalsis was present in only 10 cases out of 30 .

All the cases of small intestinal volvulus presented themselves with distention of abdomen. Hyperresonance was present in 31 out of 36 cases on per rectal examination rectum was empty in 30 cases.

11 out of 14 cases of caecal volvulus distention was the main feature. In 12 cases tenderness was the prominent feature. Visible peristalsis was seen in 7 cases of ileocaecal volvulus.

TABLE NO. XI

XI- Showing arrival at diagnosis in cases of sigmoid volvulus.

Diagnosis made	No. of cases	percentage
1. By clinical examination and confirmed by Laparotomy.	21	70.00%
2. By X-ray examination and confirmed by Laparotomy.	6	20.00%
3. Only after Laparotomy.	3	10.00%
Total	30	100.00%

Table No. XI shows that 21 out of 30 cases of sigmoid volvulus were diagnosed clinically and were confirmed by Laparotomy. 6 cases out of remaining 9 cases were diagnosed by X-ray examination and later confirmed by Laparotomy. The remaining 3 cases could not be diagnosed either by clinical or radiological means, they were only diagnosed at Laparotomy.

TABLE NO. XII

XII- Showing arrival at diagnosis in cases of small bowel volvulus.

Diagnosis made	No. of cases	Percentage
1. By clinical examination and confirmed by Laparotomy.	25	44.64%
2. By X-ray examination and confirmed by Laparotomy.	22	39.28%
3. By Laparotomy.	9	16.08%
Total	56	100.00%

Table No. XII shows that 25 cases of small intestinal volvulus were diagnosed clinically and were confirmed by Laparotomy. 22 out of remaining 31 cases of small bowel volvulus were diagnosed by X-ray examination and later confirmed by Laparotomy. The remaining 9 cases

of small bowel volvulus could not be diagnosed by either means. They were only confirmed after Laparotomy (16.08%).

TABLE NO. XIX

XIII- Showing different diagnosis made by clinical and X-ray examination of small bowel volvulus cases.

Different diagnosis made by clinical and X-ray examination.	No. of cases	Percentage
1. Diagnosis of small bowel volvulus.	25	44.64%
2. Diagnosis of acute intestinal obstruction.	22	39.28%
3. No diagnosis made.	9	16.08%
Total No. of cases	56	100.00%

Table No. XIX shows that 25 cases were diagnosed clinically as cases of small bowel volvulus and they were confirmed by laparotomy(44.64%).

In 22 cases (39.28%) diagnosis of acute intestinal obstruction was made by clinical and radiological means and which after laparotomy were confirmed to be as a cases of small bowel volvulus.

In 9 cases (16.08%) no diagnosis could

be made by any means, they were subjected to laparotomy and were found as cases of small bowel volvulus.

TABLE NO. X XV

X XV- Showing arrival at diagnosis of caecal volvulus.

Diagnosis made	No. of cases	Percentage
1. Clinically.	1	07.14%
2. By X-ray.	4	28.57%
3. By Laparotomy.	9	64.29%
Total	14	100.00%

Table No. X XV shows that one (07.14%) out of 14 cases of volvulus was diagnosed clinically and confirmed by Laparotomy. 4 cases (28.57%) were diagnosed radiologically. The remaining 9(64.29%) cases could not be diagnosed by either clinical or radiological means. They were only diagnosed by Laparotomy as caecal volvulus.

TABLE NO. XV

X V- Showing the degree of twist in different types of volvulus.

Type of volvulus	Total No. of cases.	180°	270°	360°	540°
1. Sigmoid colon.	30	8	12	7	3
2. Small Intestine	56	14	28	8	6
3. Caecum	14	3	9	2	0

Table No. X V shows that majority of the cases of small bowel volvulus, sigmoid volvulus and caecal volvulus had 180° to 270° of twist. While 7 cases of sigmoid volvulus, 8 cases of small bowel volvulus and 2 cases of caecal volvulus had 360° of twist only 9 cases of small and sigmoid volvulus had more than 360° of twist. While ileocaecal volvulus had no more than 360° of twist.

TABLE NO. XVI

XVI- Showing the depth of mesentary in various types of volvulus.

Type of volvulus	No. of cases	Depth of mesentary in Inches		
		5-6"	7-9"	10-12"
1. Sigmoid colon.	30	3	17	10
2. Small bowel.	56	48	6	2

Table No. XVI revealed that 10 cases out of 30 cases of sigmoid volvulus were having 10-12" depth of the pelvic mesocolon.

48 case out of 56 cases of small stestinal volvulus were having a depth of 5-6" of mesentary while only 2 cases were having a depth of 10-12" of the mesentary.

TABLE NO. XVII

XVII- Showing various aetiological factor for development of volvulus.

1. For sigmoid volvulus.

Type of volvulus	Predisposing factors	No. of cases	Percentage
Sigmoid volvulus.	1. Congenital bands.	2	6.67%
	2. Adhesions.	2	6.67%
	3. Loaded colon.	5	16.66%
	4. Idiopathic.	21	70.00%
Total No. of cases.	-	30	100.00%

Table No. XVII -1 reveals that for most of the cases of sigmoid volvulus no cause was found after laparotomy and they were labelled as idiopathic. The other aetiological factors were congenital bands, loaded colon, and adhesions.

2. For small bowel volvulus.

Predisposing factors	No. of cases	Percentage
1. Bands.	16	28.57%
2. Adhesions.	6	10.71%
3. Meckel's diverticulum.	1	1.78%
4. Mesenteric lymph nodes.	4	7.13%
5. Idiopathic.	29	51.78%
Total No. of cases	56	100.00%

Table No. XVII-2 shows that most of the cases of small bowel volvulus were idiopathic in which no cause could be ascertained during laparotomy (51.78%). The most common causes for development of small bowel volvulus were bands (28.57%), Adhesions (19.71%). In one case meckel's diverticulum was the cause of small bowel volvulus.

3. Showing predisposing factors for caecal volvulus.

Type of volvulus	Predisposing factors	No. of cases	Percentage
1. Caecal volvulus.	1. Mobile caecum with mesentary.	13	92.85%
	2. Adhesions.	1	7.15%
Total No. of cases.	-	14	100.00%

The above table shows that in 92.85% of cases mobile ileocolic segment was the commonest predisposing factor found in Laparotomy. We found only one case of caecal volvulus due to adhesions.

TABLE NO. XVIII

XVIII- Showing direction of twist in various types of volvulus.

Type of volvulus.	Clockwise rotation	Percentage	Anticlock wise rotation	Percenta
1. Sigmoid volvulus.	25	83.33%	5	16.67%
2. Small bowel volvulus.	49	85.71%	8	14.29%
3. Caecal volvulus.	3	21.43%	11	78.57%
Total No. of cases.	76	76.00%	24	24.00%

Table No. XVIII reveals that in 83.33% cases of sigmoid volvulus the twist was in clock wise direction. 48 out of 86 cases of small bowel volvulus had clockwise twist of mesentary. 11 out of 14 cases of caecal volvulus had anticlock wise twist (78.57%). It concluded that 76 out of 100 cases of volvulus had clock wise direction of twist in mesentary.

TABLE NO. XIX

XIX- Showing various operative procedures.

Type of volvulus	Operative Procedure	No. of cases	Percentage
1. Sigmoid volvulus.	1. Resection.	9	30%
	2. Derotation and sigmoidopexy.	20	66.66%
	3. Resection with colostomy.	1	3.34%
2. Small bowel volvulus.	1. Simple derotation.	31	35.35%
	2. Simple derotation with division of bands etc.	19	33.93%
	3. Resection.	6	10.72%
3. Caecal volvulus.	1. Caecopexy.	6	42.85%
	2. Tube caecostomy.	5	35.71%
	3. Right hemicolectomy.	3	21.44%
Total	-	100	100.00%

Table No. XIX shows that simple derotation and

sigmoidopexy was the main operative procedure performed for sigmoid volvulus. 20 cases of sigmoid volvulus out of 30 (66.66%) were treated by simple derotation and sigmoidopexy. Resection was done in 30% of cases. Only one case was treated by Resection with colostomy.

In small bowel volvulus cases simple derotation was done in 31 cases out of total 56 (55.35%). Simple derotation with division of bands and adhesions was performed in 19 cases (33.93%). Resection with end to end anastomosis was performed in 6 cases(10.72%) . In all these cases the small intestine was gangrenous due to volvulus.

For caecal volvulus in 6 cases (42.85%) caecopexy was done. Tube caecostomy was done in 5 cases(35.71%). Right hemicolectomy was performed in 3 cases(21.44%).

TABLE NO. XX

XX- Showing cases of volvulus associated with Peritonitis.

Type of volvulus.	Peritonitis present.	Percentage
1. Sigmoid volvulus.	2	6.66%
2. Small bowel volvulus.	7	12.50%
3. Caecal volvulus.	1	7.14%
Total No. of cases	10	10.00%

Table No. XX shows that total 10 out of 100 (10%) cases of different types of volvulus were associated with Peritonitis. All of them were admitted after 5 days of their onset of symptoms. Only 2 cases of sigmoid volvulus were associated with Peritonitis, and one case 72 years Hindu male expired later on due to Septicemia.

7 cases of small bowel volvulus were associated with Peritonitis, only one case a three year female child expired on second day of operation.

While in caecal volvulus only one case had peritonitis and survived after 28 days of stay in hospital.

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D I S C U S S I O N :

A total of 270 cases of acute intestinal obstruction were taken up for this study. They all were examined clinically radiologically and further, subjected to laparotomy and had the diagnosis confirmed. Out of 270 cases of acute intestinal obstruction 100 cases were confirmed after laparotomy as cases of volvulus. Patients who were relieved by routine conservative measures were not taken up for study. A study was made of the clinical features, radiological diagnostic methods and their interpretation, aetiological factors. A special note was made of incidence of mobile caecum in every case. The different types of volvulus we encountered are:-

1. Sigmoid volvulus.
2. Small bowel volvulus.
3. Caecum and ascending colon volvulus.

1. VOLVULUS OF THE SIGMOID COLON:

In the present study 30 cases of volvulus of sigmoid colon were encountered out of a total of 270 cases (11.11%) of acute intestinal obstruction operated during June 1988 to August 1989. It further constituted 30% of operated cases of volvulus. Brunsgaards(1947)

found volvulus of sigmoid colon to be 30-50% of all cases of intestinal obstruction in East European countries. Henry (1940) found the incidence to be 7% in America. Chalinieki found an incidence of 33% among the Russians. Spasokukocku on the other hand found the incidence to be 40% among the Russians. There is a wide variation in the incidence reported by the British workers. Wilson and Dunnent (1965) found the incidence to be 4% . Scott (1965) found it to be 85% amongst the Northern Iranians. Dean and Murray (1952) reported a 25% incidence in the mental hospital cases. Kreuna and Wortmann (quoted by Dean) found volvulus in 35% of their patients from Berlin.

In India volvulus of the sigmoid colon has been reported by many authors. The incidence in all studies is less than 10% , as Banerji (1943) from Eastern India 9.03% , Anderson (1956) 11.08% from Western India , Virmani (1962) 5% or less from Delhi, Sankaran (1962) 6.22% from Madurai, Jain and Prasad (1963) 5% or less from Gwalior, Penn and Kuruville (1964) 8% from Vellore, Gupta and Vaidya (1969) 9.4% from Varanasi. Recently Gupta (1972) from Kanpur has reported the incidence to be 10% .

Our observation tally with the observation of other Indian workers, that the volvulus of the sigmoid colon is common amongst vegetarians.

AGE AND SEX:

This disease is more common among males than females. In our study 18 were males and 12 females. Gupta (1972) found the incidence to be little higher among the female patients of Kanpur area (45.46%). Pataley (1972) found the incidence higher in males (79%). Foreign workers like Buxton (1950) found the ratio to be 60:40 between males and the females. Ingalles et al (1964) found the incidence to be 3-4 times more in the males. Recently C.S. Ramchandran (1969) reported 84 cases in females and 18 in males out of 102 cases of sigmoid volvulus (82.35%).

Though the volvulus of the sigmoid colon is common among males yet its incidence in females is significantly high.

Volvulus of sigmoid colon is primarily a condition of the elderly. 70% cases ranged between 41-60 years in the present study. The oldest patient was 70 years Hindu male. 6 patients were in the 11-30 years age group. The youngest being a 14 years old child. 72.42% of Gupta's cases were between 51-60 years age group. His youngest patient was a 16 years old girl and the oldest an 80 years old male. Burgess and Stewart (1961) found 69% cases above the age of 55 years.

Botsford et al (1967) reported 13 out of 18 patients above the age of 60 years, the youngest was 18 years old and the oldest was 92 years old. Pataley (1972) reported an average age of 53 years which ranged between 32-65 years. It is obvious that this disease occurs primarily in the elderly age group, but younger age groups are not immune from the volvulus of sigmoid.

RURAL AND URBAN DISTRIBUTION:

73.33% of sigmoid volvulus cases came from the rural areas of Bundelkhand region. 5 patients were muslims and total 12 patients were nonvegetarians. For all practical purposes an average Indian is a vegetarian. Even the so called nonvegetarian consumes so little of meat that it would be wrong to call them nonvegetarian. In our study a good percentage of cases of sigmoid volvulus were nonvegetarians(40%).

PRESENTING SYMPTOMS:

In our study the common symptoms were absolute constipation (100%), distention of abdomen (100%). Pain in abdomen (100%) and vomiting (33.33%). Gupta observed absolute constipation in 100% , pain in abdomen 97.4% , distention of abdomen 98.7% , vomiting in 52.00% of cases. The incidence of vomiting was higher in present study it was probably due to the fact that these cases came comparitively late (4-5 days). In our study 20 cases admitted on second and third day of the onset .

Of their symptoms only 2 patients presented themselves on the very first day of the onset of their symptoms. One patient came on the 8th day.

In 91 cases reported by Brunsgaard (1947) the duration of symptoms before admission to the hospital was 12 to 72 hours. Pataley (1972) observed an average duration of symptoms for 4 days, the shortest duration was 2-3 hours and the longest was 10 days in a 55 years aged man.

DIAGNOSIS:

Diagnosis of volvulus of, sigmoid is usually suggested by history and confirmed by clinical and radiological examination. There were still, however, certain percentage of cases which could be finally diagnosed on the operation table. In our study only 21 cases (70%) were diagnosed clinically. 6 cases (20%) were diagnosed radiologically and the rest 3 cases (10%) were only diagnosed on laparotomy. In these 10% of cases, clinical examination and radiological examination failed to confirm the diagnosis of sigmoid volvulus. Pataley reported that in 65% of cases it was possible to diagnose clinically and in 29 out of 35 cases (82.9%) it was possible to diagnose by flat film of abdomen and only 3 cases were left to undiagnosed either clinically or by

X-ray examination. In Gupta series 69.3% were diagnosed clinically the diagnosis became clear in 95.26% of cases after taking X-ray. 10.39% were undiagnosed and confirmed only at the time of laparotomy.

SMALL BOWEL VOLVULUS:

In present study 56 cases of small bowel volvulus were encountered out of 270 cases (20.74%) of acute intestinal obstruction. It constituted 56% of all operated volvulus cases.

Nipstein and Miller (1950) from Canada have reported a series of 23 cases of small bowel volvulus. Mc Walters (1945) reported a series of 130 cases of volvulus, out of which 36 cases were of small intestine (26%). Vich (1932) found an incidence of 48% in 21 British hospitals. There is a wide variation in the incidence reported by different American workers. Jular and Mc Lenathe reported an incidence of 6% in Americans while Moretz and Morton (1950) found the incidence to be only 0.01% in America.

In India, the incidence of small bowel volvulus is significantly low in comparision with British series, while high in comparision with American series. Ojha (1950) found the incidence to be 16%. Incidence of small bowel volvulus, out of all acute intestinal obstruction cases as reported by other workers is as follows:-

Anderson (1954) 7.5% , Kochar, Rai and Singh (1966) 12% , Rao (1954) 20% , Tameja (1962) 7.7% etc.

The incidence of small bowel volvulus was significantly high in the present series than the sigmoid volvulus. This is well in confirmation with the observation of Banarjee (1950) . The incidence of small bowel volvulus and sigmoid volvulus is nearly same in the series reported by Anderson (1956) , Kochar, Rai and Singh (1966) .

AGE AND SEX:

The volvulus of the small bowel is definately a disease of the younger people mostly 20-40 years of age while volvulus sigmoid is primarily the disease of the older age group usually between 40-60 years of age; though the occurrence once in a while , in either extremes of the ages, are not uncommon. The abdominal muscles are very lax in older age group and this probably could explain the more frequent occurrence of volvulus of sigmoid in them because, the volvulus sigmoid requires greater space for rotation. Also the older people are usually sedentary workers and their mesentery probably gets lengthened in size over a period of long age.

Volvulus of the small intestine is primarily a condition of young age group. 30 cases out of 56 cases of small bowel volvulus were in the age group of 21-40 years. In our study '3' patients were in the age group

of 61-70 years. The youngest case was a 2 year muslim male child while the oldest patient was a 68 years Hindu male.

Peak incidence in Penn and Kuruvilla's cases was in the age group 20-40 years. The same was reported by Ojha (1950), Babcock and Wayne, Anderson (1957) reported that average age for small bowel volvulus was 30 years. In Banarjee's series the maximum incidence was seen between the age group of 21-30 years. Morets and Morton (1950) reported 36 cases of small bowel volvulus ranging between age groups of 2 days to 60 years, but the maximum incidence was encountered between 20-40 years (50%).

It is obvious that this disease occurs primarily in the age group 20-40 years but elderly age group are not immune from small bowel volvulus.

Small bowel volvulus is more common in males than females. In the present study 36 cases (64.28%) were males and 20 cases (35.72%) were females. Ojha (1950) reported 18 cases of small bowel volvulus all of which were females. Babcock and Wayne (1946) also found the incidence to be a little higher in females (34%). Penn and Kuruvilla (1964) found the ratio to be 29:2 between males and females. Anderson (1957) found the ratio to be 12:2 between males and females. Banarjee reported the ratio to be 21:1 between males and females. Volvulus of

the small bowel is primarily a disease of the males like volvulus of the sigmoid, but the females are also liable to be involved to a significant degree. There is wide variation in the incidence and ratio of the prevalence of the disease in the two sexes. The Indian males and females, especially from the villages are heavy manual workers. This can explain the higher incidence of volvulus of small bowel in heavy workers than in sedentary workers.

RURAL AND URBAN DISTRIBUTION:

In the present study 39 patients (67.83%) were from rural population and 18 patient (32.15%) were from urban area. The patients from rural area were all heavy manual workers, and they developed volvulus with in 4-5 hours usually after taking meals. The volvulus invariably occured while they were engaged in active work in their fields. This supports the view expressed by Ojha (1950) and Kirkaldy (1946).

The occurrence in villages, their dietic habits i.e. taking meals only twice a day with fast in between, taking a heavy meal followed by immediate exertion without proper rest, tend to support the views of Ojha (1950).

PRESENTING SYMPTOMS:

In our study the common presenting symptoms were pain in abdomen and vomiting (89.28%). Constipation

(71.42%), distention (62.50%). Morets and Morton (1959) observed that pain in abdomen and vomiting were the prominent features, while constipation was present in 45% cases. Distention was present in 70% cases. In Mc Kehnie and Priestley series (1938) pain was present in 85.7% , nausea and vomiting in 74% , constipation in 51.4% , distention in only 11.4% . In Leonard and Berow's series (1938) pain and vomiting were present in 100%, constipation in 30% , and distention in 30% .

In volvulus of the small bowel, the cardinal features were pain and vomiting while in volvulus sigmoid the cardinal symptoms were distention of abdomen and absolute constipation.

42 out of 56 (73.96%) cases came to the hospital with in 3 days of onset of their symptoms. While 11 patient came on the fourth and fifth day. Only two patients came on the seventh day of the onset of their symptoms.

The patients of volvulus of small bowel came to hospital a little earlier than the volvulus 9 sigmoid. This was due to the fact that severe attacks of pain in abdomen and vomiting were more debilitating symptoms then the absolute constipation and distention of sigmoid volvulus.

DIAGNOSIS:

In most of the cases it is easy to make the diagnosis as small intestinal obstruction, but difficult to make a diagnosis of volvulus of small intestine. In the present study only 25 cases out of 36 cases of small bowel volvulus were diagnosis clinically. In 22 cases diagnosis of small bowel volvulus was supported by X-ray examination and confirmed by laparotomy. While 4 cases could not be diagnosed by either clinical or radiological means and were only confirmed ester on by laparotomy.

Moretz and Morton (1930) could not make any diagnosis in 8 cases out of 36 cases of small bowel volvulus. Of the remaining 28 cases the diagnosis of small bowel obstruction was made in 17 cases (47.2%) . The diagnosis of small bowel volvulus was made correctly in 7 cases . Kochar, Rai and Singh (1966) have mentioned that it is not possible to make a specific diagnosis of the cause and type of small bowel obstruction. Similarly Penn and Kuruvilla (1964) have reported that X-ray is always successful in confirming the diagnosis of small intestinal obstruction, but made a diagnosis of volvulus in only half.

In our study 22 cases out of 36 patients presented themselves within 2 days of starting of their symptoms. Out of these 22 cases only 6 could be diagnosed clinically as

small bowel volvulus. The classical ladder pattern and visible peristalsis, tend to be seen visibly after 24 hours, but very clearly after 48 hours. This probably explains the difficulties in diagnosing a case of small bowel volvulus in the earlier period.

3. CAECAL VOLVULUS:

In the present study 14 cases of volvulus of caecum and ascending colon were encountered out of a total of 270 cases of acute intestinal obstruction operated during the above period. It constituted 14% of all operated volvulus cases.

Its incidence, as recorded in the literature, is less than 1% of all acute intestinal obstruction. Rai, Kocher (1970) reported the incidence to be 1.3% .

The incidence of caecal volvulus is less than that of small bowel volvulus and sigmoid volvulus. But it is not so rare as in commonly believed. The low occurrence of caecal volvulus is due to the fact that caecum is retroperitoneal fixed structure with no mese caecum. The volvulus occurred only in cases who had a mobile caecum with a fair degree of mesocaecum.

AGE AND SEX DISTRIBUTION:

The disease is said to be more common among males than in females. In present study 8 (57.14%) cases were

males and 6 (42.87%) cases were females. Wilson (1965) found the incidence to be higher among females (52%) . In Keohar and Rai series (1970) all patients were males. In Hinshaw and Carter's series (1958) ratio between males and females was equal. The same was reported by Saint (1958). In Mc Graw Kraemm and Nigler series (1948) all the patients were males.

In our study 8 cases (57.14%) ranged between 21-40 years of age. The oldest patient was 65 years of age while the youngest was a 13 years old child. Saint (1958) has reported that this disease is found between the ages of 20-40 years. In the series reported by Paltin (1951) 45% were between the ages of 17 and 30 years. The youngest patient reported was an infant 10 months old, and the oldest patient was a man of 89 years of age. In Jordan and Beahrs (1953) series an incidence of 70% was found under the age of 40 years. In Mc Graw . Kraemm and Nigler (1958) series all the four patients were above 50 years of of age.

In Indian patients volvulus caecum and ascending colon is predominantly the disease of the males though females do suffer from it, once in a while. On the other hand, in Western literature, the incidence among females is much higher. This probably supports the view that volvulus occurs among heavy workers like small bowel volvulus. This is further supported by the fact that, though caecum is the part of the large bowel, yet its incidence is common in the same age group (20-40 years)

as occurs in small bowel volvulus.

RURAL AND URBAN DISTRIBUTION:

57.15% cases of caecum and ascending colon volvulus came from rural population. All the cases were Hindus and vegetarians.

Like volvulus of small bowel and sigmoid colon, caecal volvulus nearly always occurs the village folk and vegetarians. This is probably due to the fact that the same factors are responsible for production of volvulus of small bowel, sigmoid colon, and caecum.

PRESENTING SYMPTOMS:

In the present study, the main clinical features were pain in abdomen 100%, vomiting 100%, and constipation 71.42% . Distention was present in 62.50% of cases. Hinshaw and Carter (1959) divided the caecal volvulus in to two groups, according to the clinical presentation. One is acute fulminating type, and the other is acute obstructive type. The main complaint of patients in Kochar and Rai's series (1970) were, pain in abdomen, vomiting, constipation and distention. 57.15% of our cases came to hospital with in 3 days of their onset of symptoms. Only one patient came on the seventh day. In Kochar and Rai's series all the patients presented themselves on the 3rd and 4th day. In Hinshaw and Carter series 28% presented themselves on the first day of the onset of symptoms.

Weiner (1936) reported that from a clinical point of view the only diagnosis that can be made in a case of acute caecal volvulus is intestinal obstruction.

DIAGNOSIS:

Patients with volvulus caecum presented clinically with symptoms and signs of small bowel obstruction. The cardinal symptoms being pain in abdomen and vomiting. Volvulus of the small bowel also presented with similar symptoms. This clinical presentation can be explained by the fact, that there is obstruction also ileocaecal junction due to volvulus of caecum. The other group of signs which were observed due to volvulus of caecum, were in addition to the common signs of small bowel obstruction and these consisted of greater distention in the right flanks, and fullness in the right iliac fossa due to distended caecum inside. But more than 30% cases could be diagnosed only on laparotomy.

The only positive manner of arriving at a correct diagnosis is, by careful X-ray studies. In our study only one case diagnosed clinically (7.14%) . 4 were diagnosed radiologically (28.57%) 9 cases (69.29%) could be diagnosed only after laparotomy.

Chaffant (quoted from Wangenstein 1942) stated that unusual mobility of caecum and ascending colon were present in 20% of persons of all ages, but the incidence of volvulus

caecum is correspondingly and comparatively.low. It is due to the fact that the thickness of the mesocaecum i.e. the distance between the two layers of peritoneum of the mesocaecum, was quite big 1" - 2" . This hindered, mechanically, with the occurrence of volvulus caecum unless the mesocaecum was so long as to under go the twist. In our series the depth of meso caecum was so long that the caecum presented freely outside the abdominal wounds after untwisting.

While in cases of the volvulus of the small bowel and the sigmoid colon, preoperative diagnosis could be made in majority of the patients, in volvulus caecum, diagnosis was confirmed on laparotomy in a significant number of cases (69.23%).

The twist was anticlock wise in 11 cases (78.57%) and in 3 cases it was clockwise twist. Mesocaecum was present in all the cases of caecum and ascending colon and the caecum was freely mobile.

SUMMARY AND CONCLUSION:

1. 30 cases of sigmoid volvulus, 36 cases of small bowel volvulus and 14 cases of caecal volvulus have been taken for study in the present series. Incidence of small bowel volvulus is low in comparision to British literature. Incidence of caecum and ascending colon volvulus is comparatively much less than that of small bowel volvulus and sigmoid volvulus.

2. Incidence of caecal volvulus was 14% in Bundelkhand region of the total cases of volvulus and 5.14% of the total cases of acute intestinal obstruction admitted in M.L.B. Medical College, Hospital, Jhansi, during June 1988 to August 1989.

3. The incidence of sigmoid volvulus was 11.11% , of small bowel volvulus 20.73%, and of caecum and ascending colon was 5.14% of the total cases of obstruction studied.

4. The incidence of sigmoid volvulus is significantly high in low roughage eaters like Russians (30-50%) and the German (33%).

but the incidence was (28.57%) in our series, it contra dicts the incidence reported by other Indian workers.

5. Sigmoid volvulus, small bowel volvulus and caecal volvulus occured mostly in village folks (68.00%) and vegetarians (64.00%).

6. The commonest age group observed in this study for sigmoid volvulus 40-60 years (more than 50%). The commonest age group for small bowel volvulus was 20-40 years (53.58%), and of caecal volvulus was 20-50 years (78.57%).

7. The ratio of male and female was 1.5:1 for sigmoid volvulus, 2:1 in small bowel volvulus and approximately 1.25:1 in caecal volvulus.

8. The incidence of volvulus of all types is more common in Hindu's as compared to those in Muslims, i.e. 71% in Hindus and 29% in Muslims.

9. 70% of the cases of sigmoid volvulus were diagnosed clinically. X-ray examination was of great help to confirm the diagnosis. Diagnosis of small bowel volvulus was made clinically only in 44.64% cases. In rest of the cases diagnosis was made by radiological examination and Laparotomy. Only 7.14% of

caecal volvulus cases could be diagnosed clinically. In 20.57% of cases diagnosis was made of X-ray and rest of the cases of caecal volvulus could be diagnosed only at laparotomy.

10. The cardinal features of sigmoid volvulus were distention of abdomen and constipation(100%), while pain in abdomen and vomiting (89.28%) were the chief features of small bowel volvulus. Pain in abdomen and vomiting were present in all the cases of caecal volvulus.

11. Majority of the cases of small bowel volvulus and sigmoid volvulus had 180° to 270° of twist while few cases of sigmoid and small bowel had 360° of twist. But the caecal volvulus had no more than 270° of twist.

12. Majority of the cases of sigmoid and small bowel volvulus had clockwise solution of mesentary while in cases of caecal volvulus the mesentary had anticlockwise twist in majority of the cases (78.57%).

13. All the cases of caecal volvulus had mesentary. i.e. the whole ileocaecal and Ascending colon was mobile except one case which had in association of the mobile caecum adhesions were present.

14. The incidence of mobile caecum was 16% of total cases of volvulus studied and 5.16% of the total cases of acute intestinal obstruction admitted in M.L.B. Medical College, Hospital, Jhansi, during June 1988 and August 1989.

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